



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/836,844	04/17/2001	Kyle M. Hanson	291958112US1	6731
25096	7590	06/10/2004	EXAMINER	
PERKINS COIE LLP			MUTSCHLER, BRIAN L	
PATENT-SEA				
P.O. BOX 1247			ART UNIT	
SEATTLE, WA 98111-1247			PAPER NUMBER	
			1753	

DATE MAILED: 06/10/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

CP

Office Action Summary	Application No.	Applicant(s)	
	09/836,844	HANSON ET AL.	
	Examiner	Art Unit	
	Brian L. Mutschler	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 April 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8, 10-18, 20-28, 31-35, 39-42 and 47-90 is/are pending in the application.
- 4a) Of the above claim(s) 65-90 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8, 10-18, 20-28, 31-35, 39-42 and 47-64 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Comments

1. Applicant's cancellation of claims 43-46 and addition of claims 47-90 in the amendment submitted April 27, 2004, are acknowledged.
2. The rejection of claims 31-35 under 35 U.S.C. 112, second paragraph, has been overcome by Applicant's amendment to the claims.
3. Upon further reconsideration and in light of Applicant's amendments, the rejection of claims 31-35 and 39-42 under 35 U.S.C. 103 over Reid et al. in view of Wang has been withdrawn. New rejections have been applied to claims 31-35.

Continued Examination Under 37 CFR 1.114

4. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on April 27, 2004, has been entered.

Election/Restrictions

5. Newly submitted claims 65-90 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons:

The claimed method can use an apparatus other than that which is claimed (e.g., the claimed apparatus comprise additional structural features that are not used by the methods), and the claimed apparatus may be used to perform different processes (e.g., methods which utilize all of the structural features claimed by the apparatus).

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 65-90 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Claim Objections

6. Claims 34, 35, 47, 51, 52, 60, and 61 are objected to because of the following informalities:

- a. Claim 34 recites the limitations "spray processing position" (lines 3, 7, and 10) and "the at least one stream"/"the at least one fixed stream" (lines 4, 6, and 8). While it is understood that the spray processing positions relate to positions at which the stream impinges on the workpiece, the terms "spray" and "stream" are incongruous with one another. While a spray is a stream, a stream is not necessarily a spray. To maintain consistency throughout the claims, it is suggested that the term "stream" be changed to "spray".

Art Unit: 1753

- b. Claim 34 recites the limitation "the at least one fixed stream" in lines 5-6.
It is suggested that the term "fixed" be incorporated in the original introduction of the stream in claim 39 to provide proper antecedent basis for the limitation.
- c. Claim 35 no longer provides proper antecedent basis for the limitations "the initial spray processing position" and "the secondary spray processing position" in lines 4-5. It is suggested that the dependency of claim 35 be changed back to claim 34, which provides proper antecedent basis for those limitations.
- d. In claim 47 at line 15, the phrase "second annular" should be changed to --second annular channel--.
- e. In claims 51, 52, 60, and 61, the phrases "first channel" and "second channel" should be changed to --first annular channel-- and --second annular channel--, respectively.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent

Art Unit: 1753

granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. Claims 1-8, 10-18, 20-28, and 47-64 are rejected under 35 U.S.C. 102(e) as being anticipated by Reid et al. (U.S. Pat. No. 6,099,702).

Regarding claims 1, 11, 20, 47, and 56, Reid et al. disclose an electroplating chamber for plating semiconductor wafers comprising:

- a) A workpiece support **190**. The workpiece support **190** is adapted to hold a wafer **W** and is also adapted to provide electroplating power to the workpiece (fig. 1; col. 3, lines 9-11).
- b) A processing container **110**. The plating cell comprises an inner processing container **110**, which is contained within an outer container having walls **132** (fig. 1).
- c) A drive mechanism **170**. The drive mechanism **170** is an actuator capable of moving the support **190** in a vertical direction through a plurality of different positions (fig. 1; col. 3, lines 9-16).
- d) A first chemical delivery system. The first chemical delivery system comprises a pump **122** and an inlet **118** for supplying the electroplating solution to the cell (fig. 1; col. 2, lines 38-48).
- e) A first chemical collector system. Walls **112** and **132** form a channel surrounding the processing chamber **110** to reclaim excess solution **S** (fig. 1; col. 2, lines 56-67).

- f) A second chemical delivery system. The second chemical delivery system comprises a nozzle **160** to deliver a spray of a second solution to the wafer **W** (fig. 1; col. 3, lines 25-40).
- g) A second chemical collector system. The second chemical collector system comprises channel **140** to collect waste from the second chemical delivery system (fig. 1; col. 3, lines 41-55).
- h) A control system **198**. The drive mechanism **170** is controlled using instructions generated by controller **198** to move between the different processing positions (fig. 1; col. 3, lines 9-16).

Regarding claims 2, 5, 17, 18, 22, 24, 48, and 57, Reid et al. disclose that the wafer support **190** and wafer **W** are spun (col. 3, lines 25-26). During spinning at position **3**, the solution is flung into the channel **140** (col. 3, lines 41-55).

Regarding claims 3, 4, 21 and 23, Reid et al. disclose that plating is performed at a first position, position **1**, and rinsed with a solution from nozzle **160** at positions **2** and **3** located above position **1** (fig. 1; col. 3, lines 17-55). As taught by Reid et al., rinsing with a spray solution from nozzle **160** can occur in different positions, i.e., positions **2** and **3** (col. 3, lines 25-55).

Regarding claims 6, 16, and 25, the second chemical collection system comprising channel **140** has two walls **132** and **142**, corresponding to the "splash wall" and "further wall" recited in the instant claims, that form the channel **140** (fig. 1).

Regarding claims 7 and 26, an outlet **146** drains the excess waste from the collection channel **140** (fig. 1; col. 3, lines 1-8).

Regarding claims 8, 53, and 62, the control system **198** directs the drive mechanism **170** to different positions using instructions (fig. 1; col. 3, lines 9-16). Since the nozzle **160** shown in Figure 1 is positioned to direct the spray at an angle above the horizontal and the workpiece support **190** is located below the horizontal with respect to the nozzle, as the workpiece support is raised, the spray coming from the nozzle would initially impinge on an area less than an entire radius of the workpiece.

Regarding claim 10, the second chemical delivery system, nozzle **160**, is capable of delivering a stream of processing fluid to a fixed location. Reid et al. disclose that the nozzle **160** is "directed" (col. 4, lines 10-19).

Regarding claims 12, 13, 27, and 28, the actuator **170** is capable of moving the support **190** in a vertical direction (fig. 1; col. 3, lines 9-16). The support **190** can also be rotated (spun) relative to the container **110** (col. 3, lines 25-55).

Regarding claims 14 and 15, the device of Reid et al. comprises two chemical delivery systems, i.e., nozzle **160** and pump **122**/inlet **118**, and two chemical collector systems, i.e., channels **130** and **140** (fig. 1; col. 2, line 38 to col. 3, line 55).

Regarding claims 47-52, 54-61, 63, and 64, the chemical collector systems comprise three concentric, annular walls that define two concentric annular channels **130** and **140**, wherein the inlet of one channel is positioned above the entrance of the other channel (fig. 1). The two channels are in fluid communication with one another at their inlets **131** and **141** (fig. 1). In addition, the two channels are connected to two outlets **136** and **146** (fig. 1).

Since Reid et al. teach all of the structural limitations recited in the instant claims, the reference is deemed to be anticipatory. It is noted that the instant claims recite many process limitations, e.g., "the second chemical collector systems collects spent processing fluids as the spent processing fluid is flung from the microelectronic workpiece during spinning" (claim 5). The apparatus of Reid et al. is deemed capable of performing the recited intended uses of the apparatus and thus anticipates the claims.

Additionally, claims 1, 11, and 20 recite the limitation "a control system operatively coupled to the [drive mechanism/automated drive system] and programmed with instructions that direct the [drive mechanism/drive system] to move the workpiece support [during application of the spray from the chemical delivery system so as to vary the radial position of the initial contact between the spray and the workpiece or to move the workpiece while the chemical delivery system directs the at least one stream toward the workpiece]". The instant claims therefore require the following structural limitations: (1) a control system coupled to the drive mechanism; (2) the control system must be capable of holding instructions; and (3) the control system must be capable of providing those instructions to control the movement of the drive mechanism. The apparatus of Reid et al. comprises a control system that is coupled to the drive system and uses instructions to control the movement of the workpiece support. Therefore, the control system taught by Reid et al. has all of the structural limitations recited in the instant claims.

Art Unit: 1753

9. Claims 31-35, and 39-42 are rejected under 35 U.S.C. 102(e) as being anticipated by Wang (U.S. Pat. No. 6,391,166).

Regarding claim 39, Wang discloses an apparatus for processing a microelectronic workpiece comprising a workpiece support **29** to hold a workpiece **31** and a processing vessel to receive the workpiece (fig. 66). The apparatus further comprises a drive system coupled to the workpiece support to move the workpiece along a first axis relative to the processing vessel between a first position and a second position (col. 41, lines 25-49; col. 45, lines 20-43). The drive system is also configured to tilt the workpiece support relative to the vessel about a second axis transverse to the first axis (fig. 66; col. 41, lines 25-49). The apparatus has a fluid delivery system (pump) that directs a stream of processing fluid toward the workpiece support (fig. 66; col. 41, lines 25-49).

Regarding claim 31, the apparatus comprises a drive system to rotate the workpiece and a fluid collector system to collect spent processing fluid (figs. 66-68; col. 41, lines 25-56).

Regarding claim 32, as shown in Figures 66-68, the fluid collector system comprises two walls that define the collection channel, which are equivalent to the splash wall and the further wall of the instant claims (figs. 66-68).

Regarding claim 33, the fluid collector system further comprises an outlet concentric to the inlet **800** (fig. 66).

Regarding claim 34, the control system directs the drive mechanism vertically towards the processing vessel as the pump drives a stream of processing fluid against

the workpiece (figs. 66-68; col. 41, lines 25-56). The fluid impinges on a first portion as when the workpiece first contacts the fluid and other positions as the workpiece is lowered to its final position in the vessel (figs. 66-68).

Regarding claim 35, the apparatus comprises a drive mechanism that moves the workpiece support in a vertical direction (figs. 66-68; col. 41, lines 25-49).

Regarding claims 40 and 41, the fluid delivery system is positioned to direct processing fluid toward the workpiece support **29** while the workpiece is in a first position, where an edge of the workpiece first touches contacts the solution, and while the workpiece is in a second position, where the workpiece is fully immersed in the solution (fig. 66; col. 41, lines 25-49).

Regarding claim 42, the apparatus comprises a control system coupled to the drive system to direct the drive system to move the workpiece support (col. 45, lines 20-43). Although not a structural limitation, in the method disclosed by Wang, the drive system moves the workpiece while the fluid delivery system is directing the stream of processing fluid, i.e., from the time of delivery to the bath in step 1 to when the pump is turned off in step 6 (col. 41, lines 25-49).

Since Wang teaches all of the structural limitations recited in the instant claims, the reference is deemed to be anticipatory.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 1753

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 1-5, 8, 10, 20, 22 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dordi et al. (U.S. Pat. No. 6,416,647) over Reid et al. (U.S. Pat. No. 6,099,702).

Regarding claims 1 and 20, Dordi et al. disclose an electroplating apparatus for processing semiconductor wafers comprising:

- a) A workpiece support **204** (fig. 2).
- b) A processing container **100** (fig. 2).
- c) A drive mechanism. The drive mechanism comprises an actuator **346** that is capable of moving the workpiece to a plurality of locations (col. 16, lines 21-23).
- d) A plurality of chemical delivery systems. The apparatus has means to provide an electroplating solution and a rinsing solution to the workpiece (col. 15, lines 12-25; col. 16, lines 7-20). One chemical delivery system comprises spouts **260** to spray the rinsing solution (col. 16, lines 7-10).
- e) A plurality of chemical collector systems. The plurality of chemical collector systems comprises outlets **258** and **259** (fig. 2).

Regarding claims 2, 5, 22 and 24, the substrate support member **204** is capable of spinning to dry the workpiece, i.e., removing the solution (col. 16, lines 15-20).

Regarding claims 3 and 4, the position for plating the wafer is located vertically above the position for rinsing the wafer (col. 16, lines 7-8).

Regarding claim 8, the spouts **260** are directed at an angle below the horizontal and the workpiece support **204** is located above the horizontal with respect to the spouts (fig. 3). Therefore, as the workpiece support **204** is lowered, the spray from the spout would initially impinge on less than an entire radius of the workpiece.

Regarding claim 10, the spouts **260** are capable of delivering a stream to a fixed position.

The apparatus of Dordi et al. differs from the instant invention because Dordi et al. do not disclose a control system to direct the drive mechanism, as recited in claims 1, 8 and 20.

Reid et al. disclose an apparatus for performing a variety of processes on a workpiece comprising a drive mechanism controlled by a control system that provides instructions to the drive mechanism (col. 3, lines 9-16).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the apparatus of Dordi et al. to use a control system to direct the drive mechanism as taught by Reid et al. because providing an automatic or mechanical means to replace a manual activity which accomplished the same result is not sufficient to distinguish over the prior art (see *In re Venner*, 262 F.2d 91, 95, 120 USPQ 193, 194 (CCPA 1958)).

Allowable Subject Matter

12. The following is a statement of reasons for the indication of allowable subject matter:

Claim 34 would be allowable if amended to overcome the objections noted above and if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Wang teaches a stream that impinges on the workpiece and a drive mechanism to lower the workpiece into the processing vessel. However, claim 34 would be allowable over the apparatus of Wang because Wang neither teaches nor suggests the use of a spray (as opposed to a stream). While Reid et al. disclose the use of a spray to rinse a workpiece that is vertically moved, the apparatus of Reid et al. does not provide for a tilting workpiece support and the use of such a support would not be obvious in light of the arrangement of the structural features and the method of use taught by Reid et al. The ability to tilt the workpiece to direct a spray of processing fluid to impinge on different portions of the workpiece would provide a more effective spray pattern, especially when the processing fluid is a rinsing fluid.

Response to Arguments

13. Applicant's arguments filed April 27, 2004, have been fully considered but they are not persuasive.

14. Regarding the 102 rejection based on Reid et al., Applicant argues, "Reid fails to disclose a control system 'programmed with instructions that direct the drive mechanism to move the workpiece support during application of the spray from the second chemical delivery system so as to vary the radial position of [an] initial contact between the spray and the microelectronic workpiece'" (see page 24 of Applicant's response).

Art Unit: 1753

15. This argument is not persuasive because Reid et al. teaches all of the structural limitations recited in the instant claims. Reid et al. teaches a control system coupled to the drive mechanism that contains instructions to direct the movement of the drive mechanism. The recited control system is neither coupled to the fluid delivery system nor controls the fluid delivery system. Therefore, Reid et al. teach all of the structural limitations recited in the instant claims, the reference is deemed to be anticipatory.

16. Regarding the 102 rejection based on Wang, Applicant argues "Wang fails to disclose or suggest 'a fluid delivery system positioned to direct at least one stream of processing fluid toward the workpiece support to impinge on a microelectronic workpiece while the workpiece support holds the microelectronic workpiece'" (see page 25 of Applicant's response).

17. This argument is not persuasive because Wang teaches a pump that drives a stream of fluid through the inlet towards the workpiece while the workpiece is held by the support (see figs. 66-68).

Conclusion

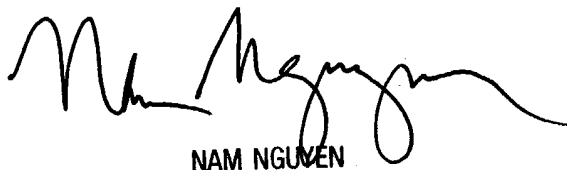
18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian L. Mutschler whose telephone number is (571) 272-1341. The examiner can normally be reached on Monday-Friday from 7:30am to 4:00pm.

Art Unit: 1753

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

BLM
June 8, 2004



NAM NGUYEN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700